

Incremental Sampling Methodology (ISM)

**EMDQ Workshop
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Why Collect Soil Samples?

Representative Data:

- ▶ Accurate
- ▶ Reproducible
- ▶ Defensible



....but how do we get it?

Incremental Sampling Methodology (ISM)

.....may be your answer.....

Are Your Samples Representative?

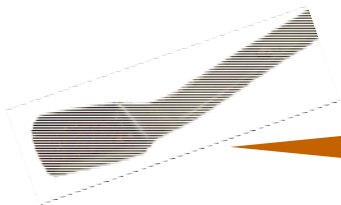
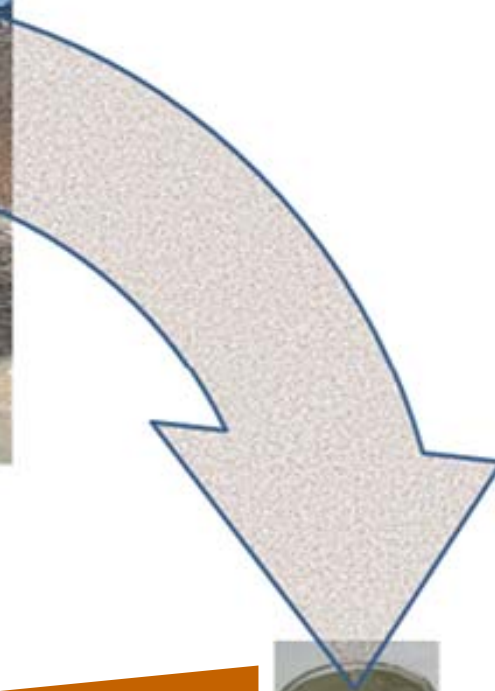
- ▶ How fully do you plan your sampling event?
- ▶ Are you confident in your sample results?
- ▶ How representative are your samples?
- ▶ Do you understand the distribution?
- ▶ How reproducible are your data?



Sample Results - #%*&^%!



What Does the Sample Represent?



Representative subsampling



What Do These Environmental Criteria Have In Common?



- ▶ Most risk-based environmental criteria based on estimate of mean
 - Soil screening levels
 - Regional screening levels
 - Site-specific cleanup levels
 - Exposure point concentrations

Uncertainty Sources



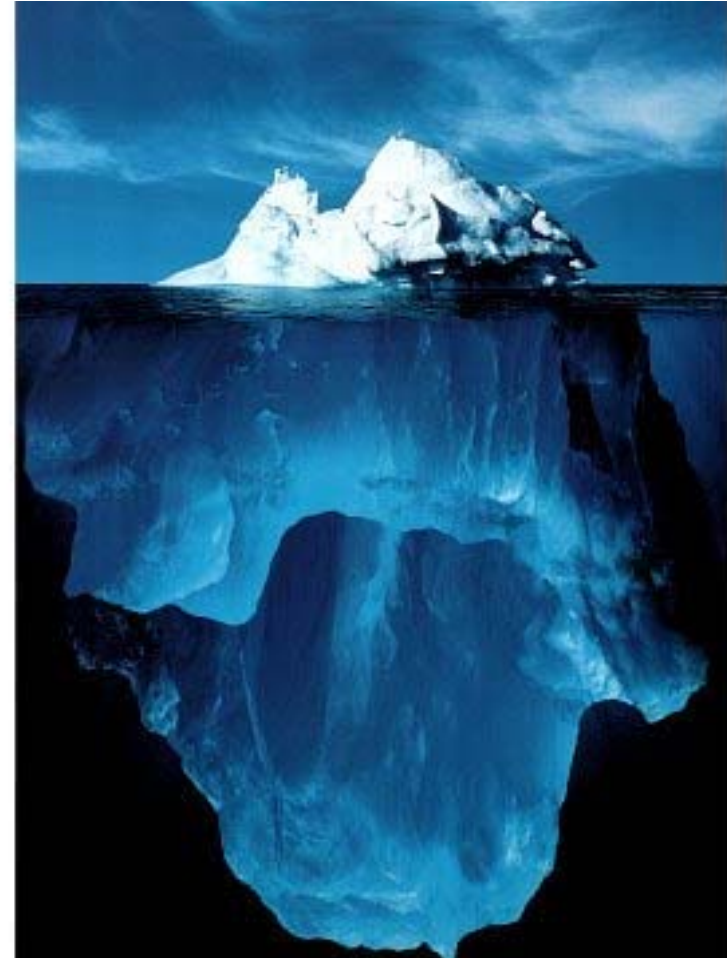
- ▶ Instrument analysis
- ▶ Sample preparation
- ▶ Laboratory sub-sampling
- ▶ Field sample collection



Uncertainty Sources



- ▶ Instrument analysis
 - ▶ Sample preparation
-
- ▶ Laboratory sub-sampling
 - ▶ Field sample collection



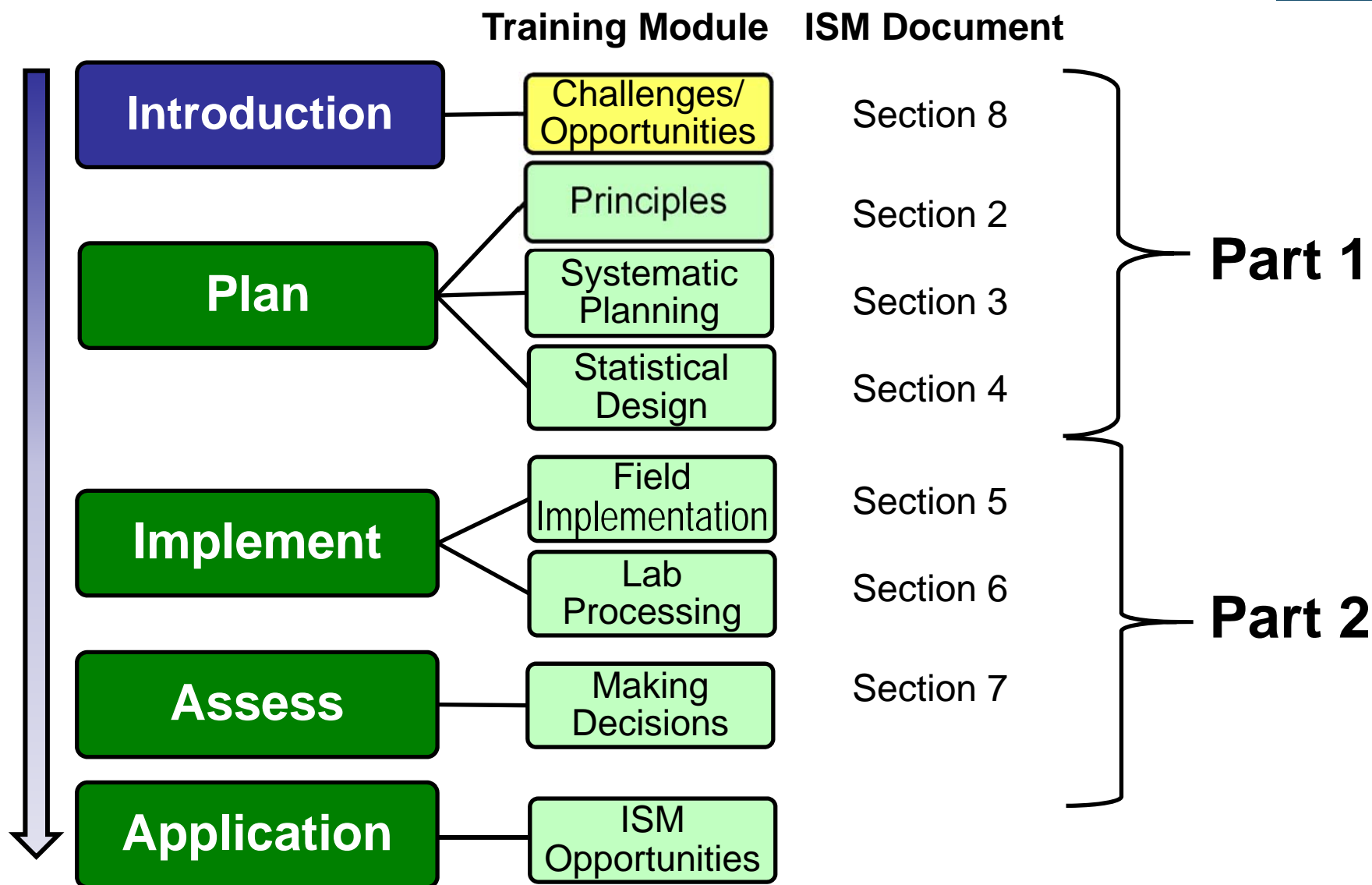
What is Incremental Sampling Methodology (ISM)?

ISM Objective: To obtain a single sample for analysis that has the mean analyte concentration representative of the decision unit

- ▶ Structured composite sampling and processing protocol
- ▶ Reduces data variability
- ▶ Provides a reasonably unbiased estimate of mean contaminant concentrations in an area/volume of soil targeted for sampling

Decision Unit (DU): the smallest volume of soil (or other media) for which a decision will be made based upon ISM sampling

ISM Document and Training Roadmap



2009 ISM Survey: Areas of Question/Concern



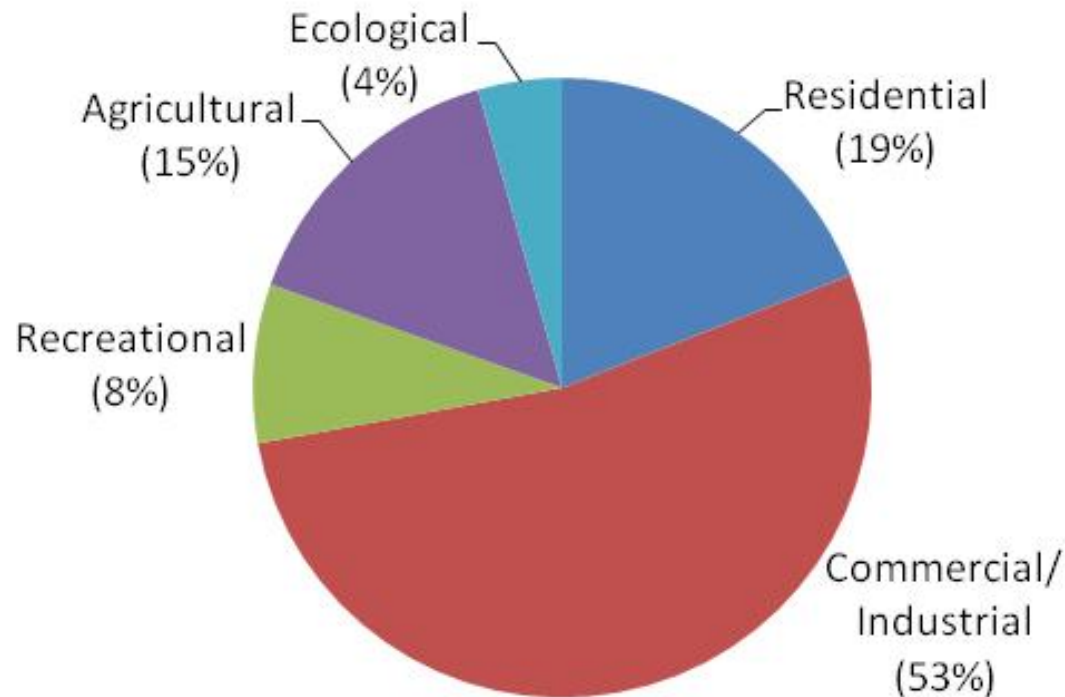
263 responses (75% respondents state regulators and consultants)

- ▶ Can ISM find “hot spots”?
- ▶ Do regulators allow or accept ISM?
- ▶ Can you collect volatile organic compound (VOC) samples?
- ▶ Does ISM delineate the extent of contamination?
- ▶ What’s the right size for a Decision Units (DUs)?
- ▶ Can you obtain Upper Confidence Limits (UCLs)?
- ▶ Can ISM and discrete results be compared?
- ▶ Are there approved laboratory processes and certification?
- ▶ How much does ISM cost?

Reluctance to use ISM stems from a lack of experience

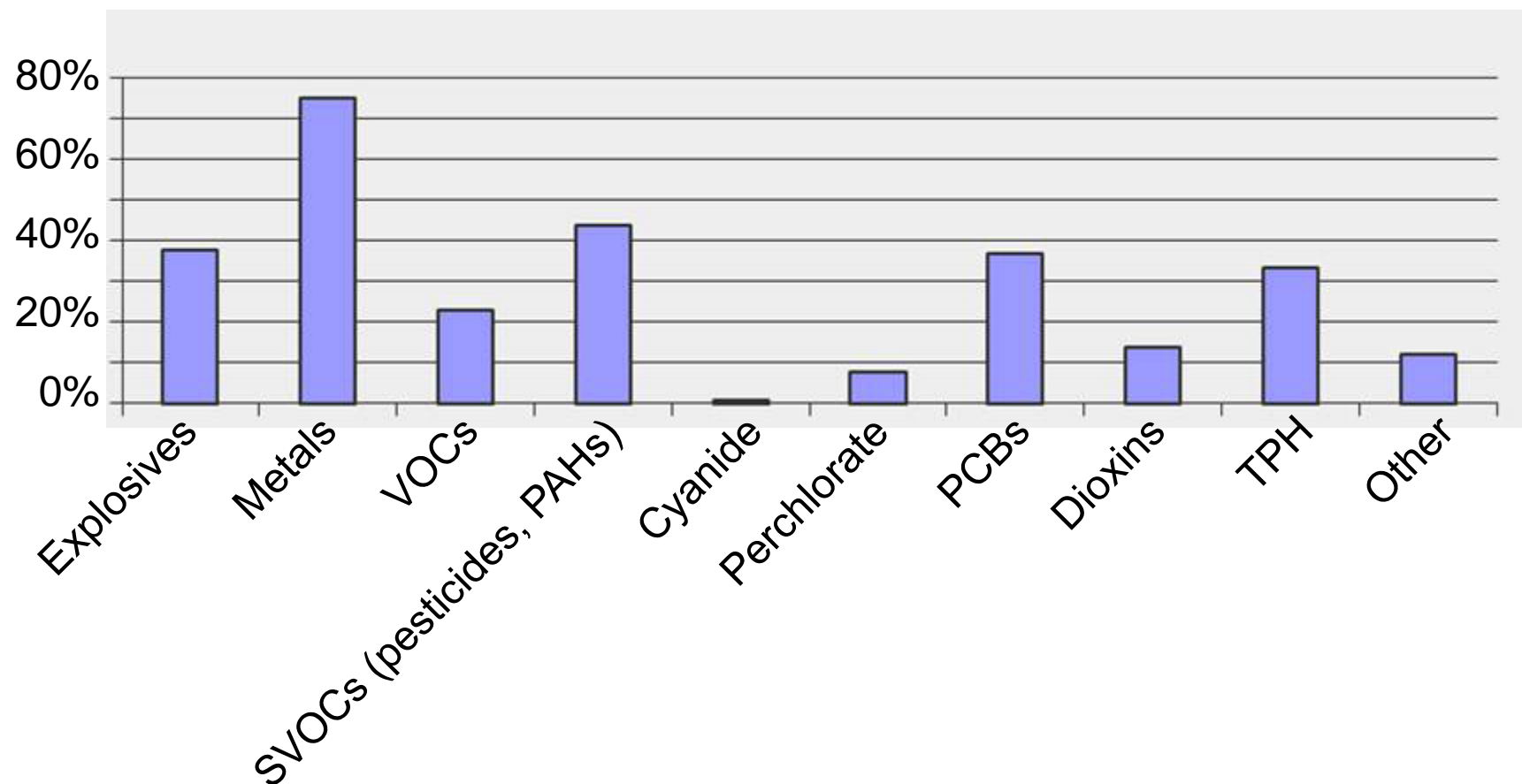
2009 ISM Survey: ISM Sampling and Land Use

ISM primarily used at commercial/industrial sites
but applicable to all types of sites



2009 ISM Survey: Chemicals of Interest for Incremental Sampling?

ISM can be used at sites with a broad range of contaminants



ISM – What is Your Perception? 2009 ISM Survey Revealed.....

- ▶ Common misperceptions: “It’s just composite sampling, misses hot spots, and costs more.”
- ▶ Few state regulators had heard of ISM and very few with ISM experience
- ▶ Hawaii, California, and Alaska made up over 40% of the reported ISM projects
- ▶ More than half of the state regulators responded that ISM was discouraged

We accepted the challenge to provide tools for state regulators, consultants, and others to learn the value of ISM and how to apply ISM

Our ITRC Solution: ITRC ISM-1 Technical and Regulatory Guidance Document



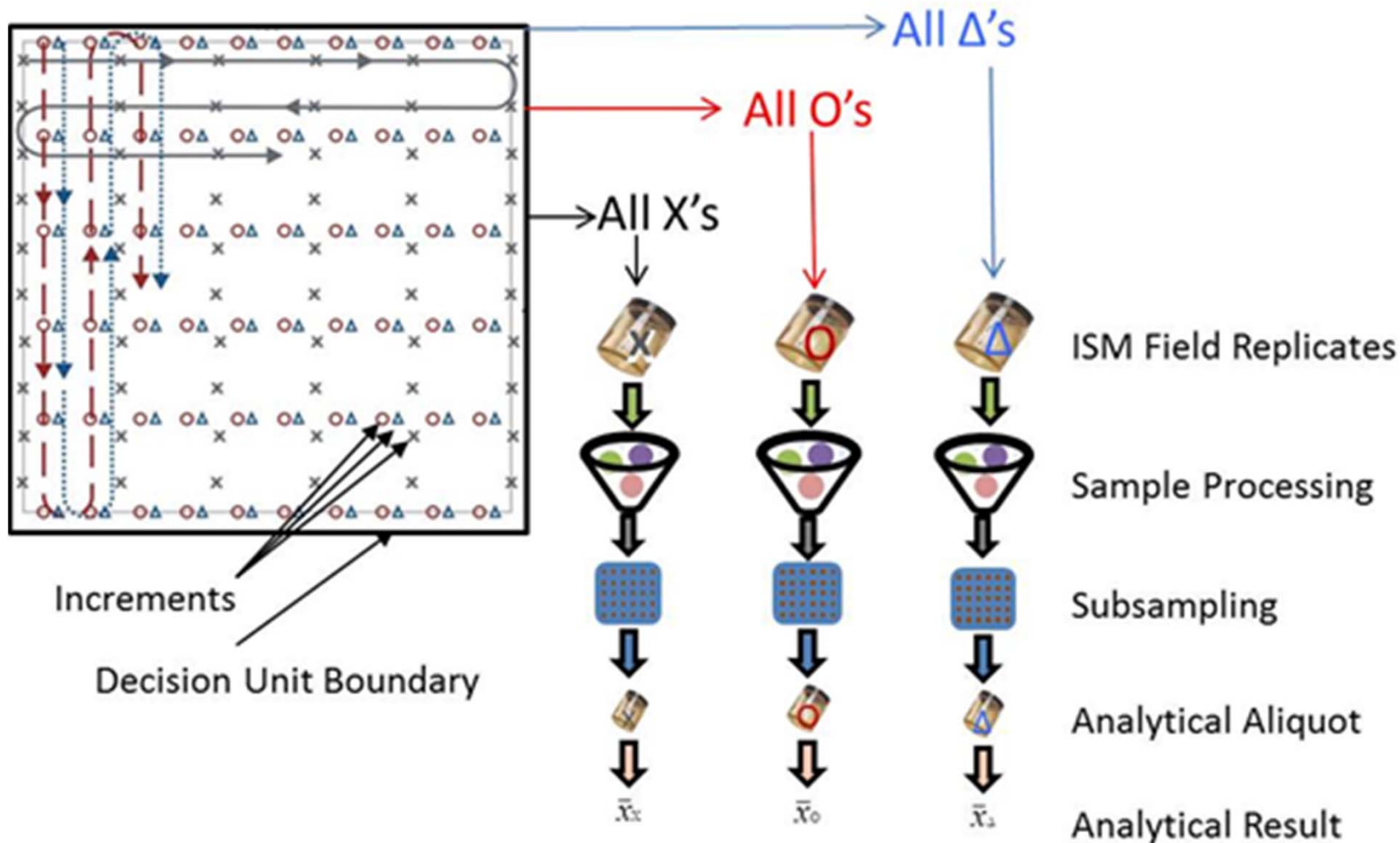
Web-Based Document at:
<http://www.itrcweb.org/ISM-1/>



- ▶ Fundamental understanding of how and why ISM works
- ▶ Detailed instructions for design and implementation
- ▶ Addresses potential regulatory concerns
- ▶ Provides case studies and simulations



What is Incremental Sampling Methodology (ISM)?



Advantages and Limitations of ISM

Include acute toxicity?

Advantages of ISM	Effect
Improved spatial coverage (increments x replicates)	• Sample includes high and low concentrations in proper proportions
Higher Sample Mass	• Reduces errors associated with sample processing and analysis
Optimized processing	• Representative subsamples for analysis
Fewer non-detects	• Simplifies statistical analysis
More consistent data	• More confident decision
Limitations of ISM	Effect
Small number of replicates	• Limits Upper Confidence Limit calculation methods
No spatial resolution within Decision Unit	<ul style="list-style-type: none"> • Limits remediation options within Decision Unit • Limits multivariate comparisons

ISM – What's In It For YOU?

- ▶ Fewer analyses but a more representative sample
- ▶ High quality data leads to a more confident decision
- ▶ Potential for cost savings

Are YOU the next ISM User?

This training will provide answers and show you how ISM fits with sampling and decision making.

How

?

Why

When

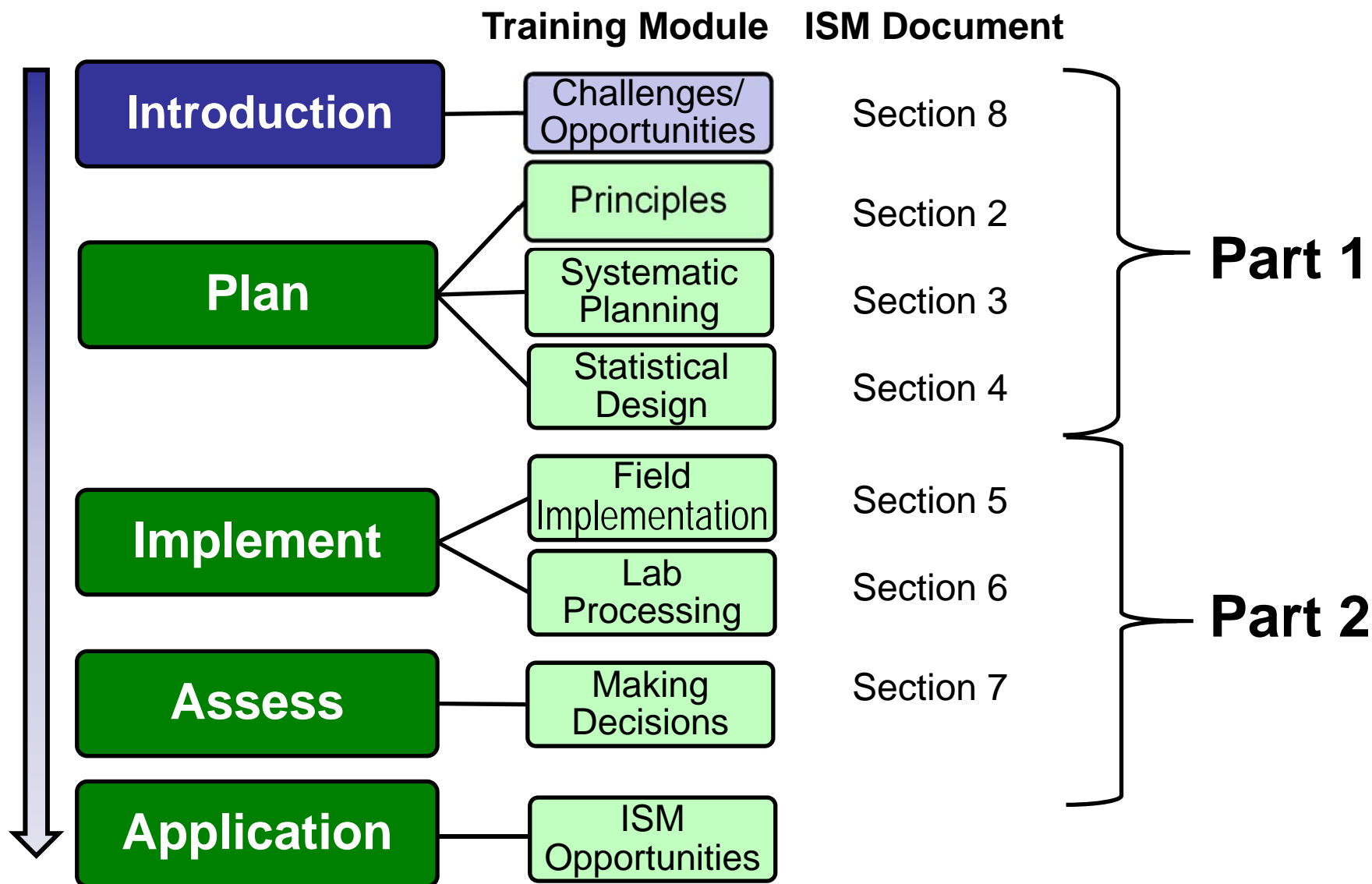
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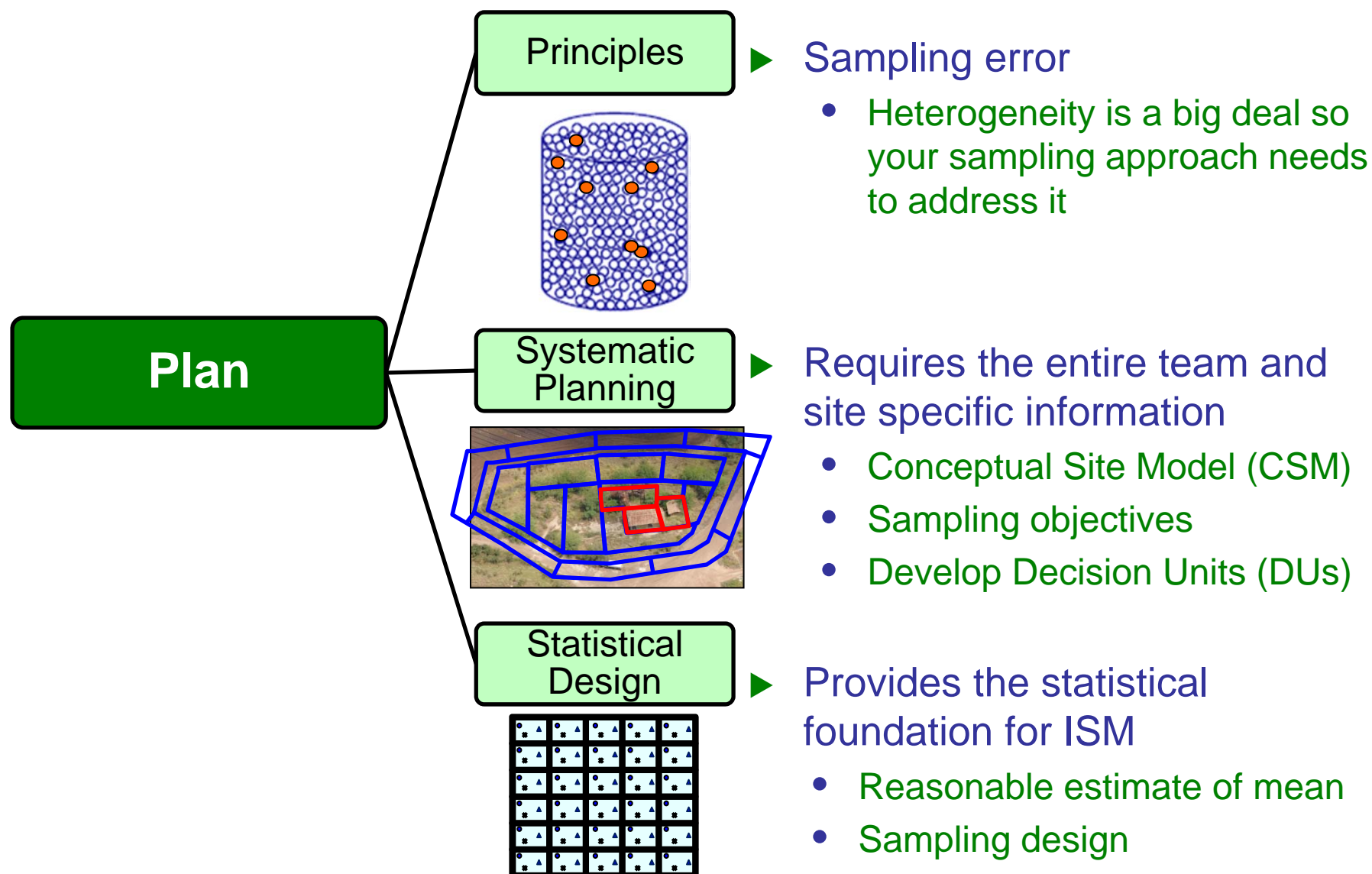
What

Where

ISM Document and Training Roadmap



ISM Part 1 – Principles, Systematic Planning, and Statistical Design



ITRC ISM Document and Training Roadmap

